

CLAIMS

What is claimed is:

1. A method of gray balance adjustment and color saturation adjustment comprising:

determining a relative amount of gray in initial CMY data values;

determining a relative amount of chroma in the initial CMY data values; and

for each of the initial CMY data values, adding a portion of a corresponding maximum gray balance adjusted value and a portion of a corresponding maximum color saturation adjusted value to produce respective gray balance adjusted and color saturation adjusted CMY data values; and

wherein the portion of a corresponding maximum gray balance adjusted value is a function of the relative amount of gray and the portion of the maximum saturation adjusted value is a function of the relative amount of chroma.

2. The method of claim 1 wherein determining a relative amount of gray comprises calculating a ratio between a minimum of the initial CMY data values and a maximum of the initial CMY data values.

3. The method of claim 1 wherein determining a relative amount of chroma comprises calculating $(1 - \text{RATIO})$ wherein RATIO is a ratio between a minimum of the initial CMY data values and a maximum of the initial CMY data values.

4. The method of claim 1 wherein:

determining a relative amount of gray comprises determining a relative amount of gray using:

$$\text{RATIO} = \text{MIN}(\text{C}, \text{M}, \text{Y}) / \text{MAX}(\text{C}, \text{M}, \text{Y})$$

wherein $\text{MIN}(\text{C}, \text{M}, \text{Y})$ is a minimum of the initial CMY data values and $\text{MAX}(\text{C}, \text{M}, \text{Y})$ is a maximum of the initial CMY data values;

determining a relative amount of chroma comprises calculating $(1-\text{RATIO})$; and

adding a portion of a corresponding maximum gray balance adjusted value and a portion of a corresponding maximum color saturation adjusted value to produce respective gray balance adjusted and color saturation adjusted CMY data values comprises:

$$\text{C} = \text{GRAYBAL_C}(\text{C}) * \text{RATIO} + \text{SAT_C}(\text{C}) * (1 - \text{RATIO})$$

$$\text{M} = \text{GRAYBAL_M}(\text{M}) * \text{RATIO} + \text{SAT_M}(\text{M}) * (1 - \text{RATIO})$$

$$\text{Y} = \text{GRAYBAL_Y}(\text{Y}) * \text{RATIO} + \text{SAT_Y}(\text{Y}) * (1 - \text{RATIO})$$

wherein $\text{GRAYBAL_C}(\text{C})$, $\text{GRAYBAL_M}(\text{M})$ and $\text{GRAYBAL_Y}(\text{Y})$ are maximum gray balance adjusted values, and $\text{SAT_C}(\text{C})$, $\text{SAT_M}(\text{M})$ and $\text{SAT_Y}(\text{Y})$ are maximum color saturation adjusted values.

5. A method of gray balance adjustment and color saturation adjustment comprising:

determining a relative amount of gray in initial primary color data values;

determining a relative amount of chroma in the initial primary color data values;

for each of the primary color data values, adding a portion of a corresponding maximum gray balance adjusted value and a portion of a corresponding maximum saturation adjusted value to produce respective gray balanced and color saturation adjusted primary color data values; and

wherein the portion of a corresponding maximum gray balance adjusted value is a function of the relative amount of gray and the portion of the maximum saturation adjusted value is a function of the relative amount of chroma.

6. The method of claim 5 wherein determining a relative amount of gray comprises calculating a ratio between a minimum of the initial primary color data values and a maximum of the initial primary color data values.

7. The method of claim 5 wherein determining a relative amount of chroma comprises calculating $(1 - \text{RATIO})$ wherein RATIO is a ratio between a minimum of the initial primary color data values and a maximum of the initial primary color data values.

8. A method of gray balance adjustment and color saturation adjustment, comprising:

generating respective gray balancing components for initial CMY data values;

generating respective color saturation adjustment components for the initial CMY data values; and

adding respective gray balancing components and respective color saturation adjustment components to produce respective gray balanced and color saturation adjusted CMY data values.

9. The method of claim 8 wherein:

each gray balancing component comprises a portion of a corresponding maximum gray balance adjusted value, wherein such portion of a corresponding maximum gray balance adjusted value is a function of a relative amount of gray in the initial CMY data values; and

each color saturation adjustment component comprises a portion of a corresponding maximum color saturation adjusted value, wherein such portion of a corresponding maximum color saturation adjusted value is a function of a relative amount of chroma in the initial CMY data values.

10. The method of claim 8 wherein generating respective gray balancing components comprises calculating:

$\text{GRAYBAL_C(C)} \times \text{RATIO}$

$\text{GRAYBAL_M(M)} \times \text{RATIO}$

$\text{GRAYBAL_Y(Y)} \times \text{RATIO}$

wherein GRAYBAL_C(C) , GRAYBAL_M(M) and GRAYBAL_Y(Y) are maximum gray balance adjusted values, and RATIO is a ratio between a minimum of the initial CMY data values, and a maximum of the initial CMY data values.

11. The method of claim 8 wherein generating respective color saturation adjustment components comprises calculating:

$$\text{SAT_C(C)} * (1 - \text{RATIO})$$

$$\text{SAT_M(M)} * (1 - \text{RATIO})$$

$$\text{SAT_Y(Y)} * (1 - \text{RATIO})$$

wherein SAT_C(C), SAT_M(M) and SAT_Y(Y) are maximum color saturation adjusted values, RATIO is a ratio between a minimum of the initial CMY data values and a maximum of the initial CMY data values.

12. A method of gray balance adjustment and color saturation adjustment, comprising:

generating respective gray balancing components for initial primary color data values;

generating respective color saturation adjustment components for the initial primary color data values; and

adding respective gray balancing components and respective color saturation adjustment components to produce respective gray balanced and color saturation adjusted primary color data values.

13. The method of claim 12 wherein:

each gray balancing component comprises a portion of a corresponding maximum gray balance adjusted value, wherein such portion of a corresponding maximum gray balance adjusted value is a function of a relative amount of gray in the initial primary color data values; and

each color saturation adjustment component comprises a portion of a corresponding maximum color saturation adjusted value, wherein such portion of a corresponding maximum color saturation adjusted value is a function of a relative amount of chroma in the initial primary color data values.